Upper Upper Miocene Fan 1 (UM3 F1) Play

Cristellaria "K" through *Robulus* "E" biozones

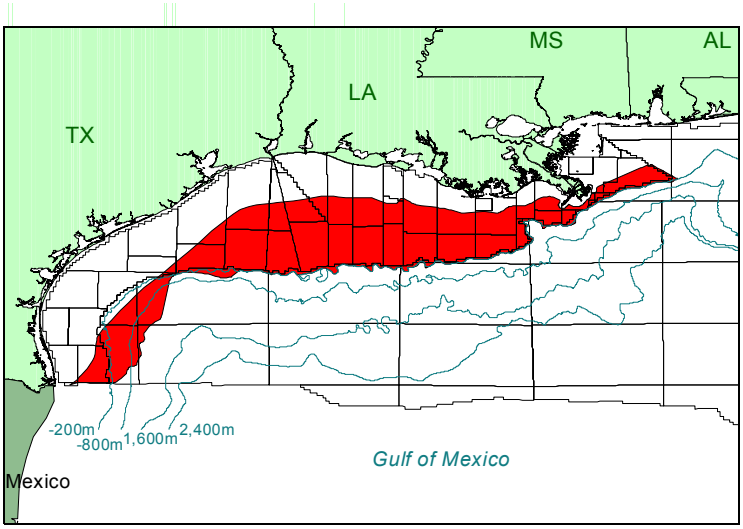

Figure 1. Play location.

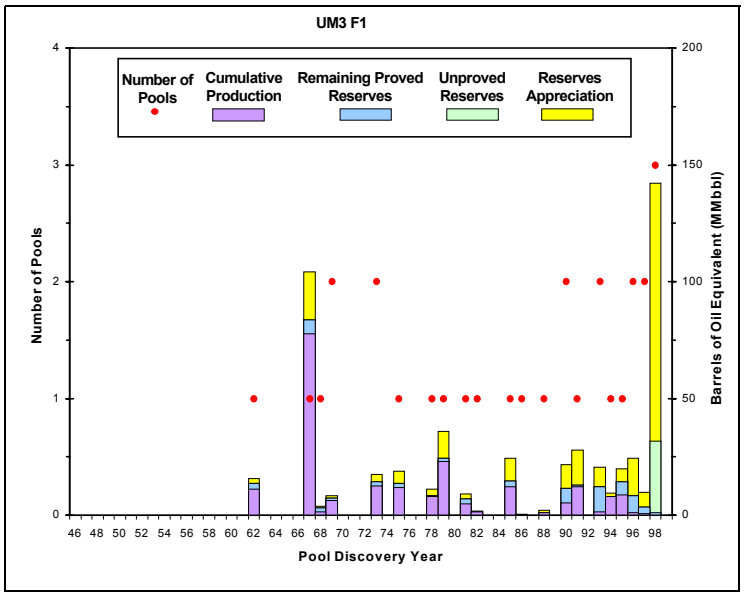

Figure 2. Exploration history graph showing reserves addition and number of pool discoveries by year.

UM3 F1 Play 29 Pools 82 Sands	Minimum	Mean	Maximum
Water depth (feet)	57	164	428
Subsea depth (feet)	6200	13339	17697
Number of sands per pool	1	3	17
Porosity	17%	25%	35%
Water saturation	16%	29%	55%

Table 1. Pool attributes. Values are volume-weighted averages of individual reservoir attributes.

Play Description

The established Upper Upper Miocene Fan 1 (UM3 F1) play occurs within the *Cristellaria* "K," *Bigenerina* "A," and *Robulus* "E" biozones. The play is also defined by deep-sea fan sediments in an extensional structural regime of salt-withdrawal basins and extensive listric faulting located on the modern Gulf of Mexico Region shelf. The play extends from the South Padre Island and Port Isabel Areas offshore Texas to the Main Pass Area east of the present-day Mississippi River Delta (figure 1).

Updip, the play is bounded by the shelf/slope break associated with the *Robulus* "E" biozone and grades into the deposits of the Upper Upper Miocene Progradational (UM3 P1) play. To the northeast, the UM3 F1 play is bounded by deposits of the Upper Upper Miocene Aggradational/Progradational (UM3 A/P1) play overlying the Cretaceous carbonate shelf. To the southwest, the play extends into Mexican national waters. Downdip, the UM3 F1 play is limited by the structural boundary of the Upper Upper Miocene Fan 2 (UM3 F2) play.

Play Characteristics

The UM3 F1 play is characterized by deepwater turbidites deposited basinward of the *Robulus* "E" biozone shelf margin on the Upper Upper Miocene upper and lower slopes, in topographically low areas between salt structure highs and on the abyssal plain. Component depositional facies include channel/levee complexes, sheet-sand lobes, interlobes, lobe fringes, and slumps. These deep-sea fan systems are often overlain by thick shale intervals representative of zones of sand bypass on the shelf, or sand-poor zones on the slope.

Many of the fields in the UM3 F1 play are structurally associated

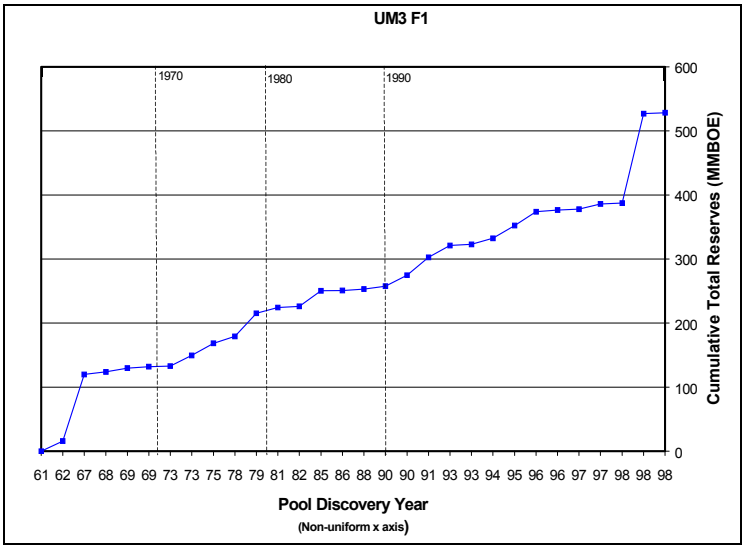

Figure 3. Plot of pools showing cumulative reserves by discovery order. Note the non-uniform x axis.

UM3 F1 Play Marginal Probability = 1.00	Number of Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Reserves				
Original proved	27	0.110	0.867	0.264
Cumulative production	--	0.089	0.674	0.209
Remaining proved	--	0.021	0.193	0.055
Unproved	2	0.007	0.135	0.031
Appreciation (P & U)	--	0.064	0.950	0.233
Undiscovered Conventionally Recoverable Resources				
95th percentile	--	0.130	2.054	0.514
Mean	55	0.229	3.038	0.769
5th percentile	--	0.415	4.602	1.206
Total Endowment				
95th percentile	--	0.311	4.006	1.042
Mean	84	0.410	4.990	1.298
5th percentile	--	0.596	6.554	1.734

Table 2. Assessment results for reserves, undiscovered conventionally recoverable resources, and total endowment.

with normal faults and salt diapirs with hydrocarbons trapped on diapir flanks or in sediments draped over diapir tops. Less common trapping structures include growth fault anticlines. Seals are provided by the juxtaposition of reservoir sands with shales and salt, either structurally (e.g., faulting, diapirism) or stratigraphically (e.g., lateral shale-outs, overlying shales).

Discoveries

The UM3 F1 mixed gas and oil play contains total reserves of 0.181 Bbo and 1.952 Tcfg (0.528 BBOE), of which 0.089 Bbo and 0.674 Tcfg (0.209 BBOE) have been produced. The play contains 82 producible sands in 29 pools, of which 27 contain proved reserves (table 1; refer to the Methodology section for a discussion of reservoirs, pools, and sands). The first reserves in the play were discovered in the South Marsh Island 23 field in 1962 (figure 2). Maximum yearly total reserves of 142 MMBOE were added in 1998 when three pools were discovered, including the largest pool in the play in the Grand Isle 116 field (Hickory) with 140 MMBOE in total reserves (figures 2 and 3). Eighty-two percent of the play's cumulative production and forty-eight percent of the play's total reserves have come from pools discovered before 1990. The most recent discoveries, prior to this study's cutoff date of January 1, 1999, were in 1998.

The 29 discovered pools contain 191 reservoirs, of which 81 are nonassociated gas, 98 are undersaturated oil, and 12 are saturated oil. Cumulative production has consisted of 57 percent gas and 43 percent oil.

Assessment Results

The marginal probability of hydrocarbons for the UM3 F1 play is 1.00. The play has a mean total endowment of 0.410 Bbo and 4.990 Tcfg (1.298 BBOE) (table 2). Sixteen percent of this BOE mean total

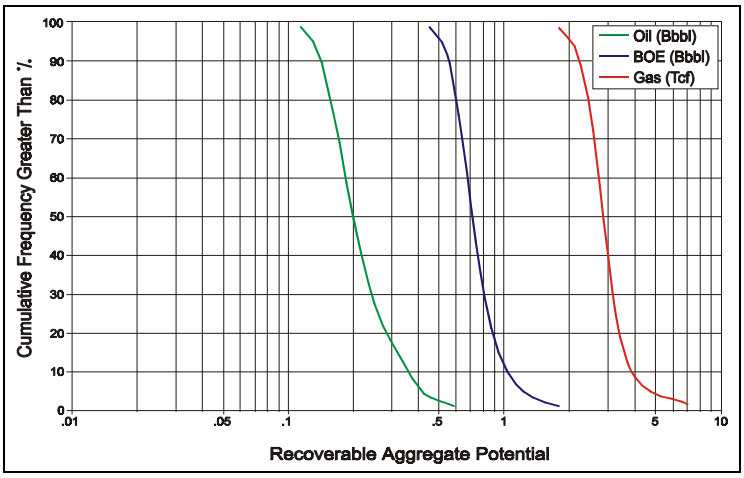

Figure 4. Cumulative probability distribution for undiscovered conventionally recoverable resources.

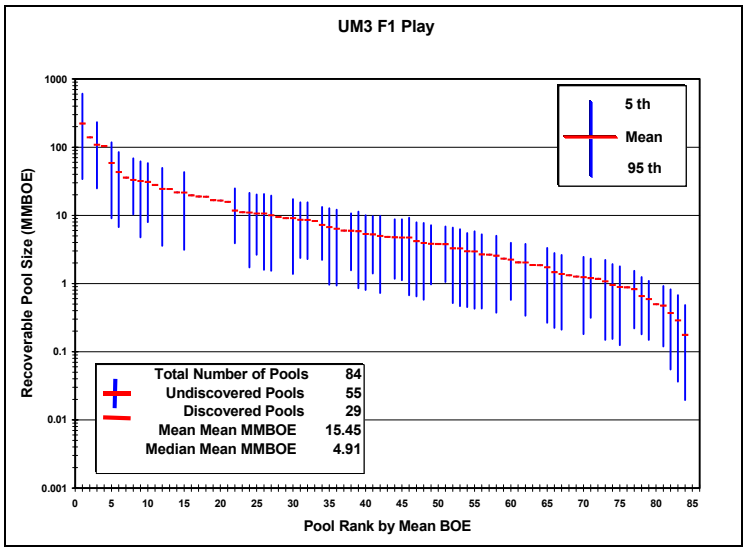

Figure 5. Pool rank plot showing the number of discovered pools (red lines) and the number of pools forecast as remaining to be discovered (blue bars).

endowment has been produced.

Assessment results indicate that undiscovered conventionally recoverable resources (UCCR) have a range of 0.130 to 0.415 Bbo and 2.054 to 4.602 Tcfg at the 95th and 5th percentiles, respectively (figure 4). Mean UCRR are forecast at 0.229 Bbo and 3.038 Tcfg (0.769 BBOE). These undiscovered resources might occur in as many as 55 pools. The largest undiscovered pool, with a mean size of 223 MMBOE, is also forecast as the largest pool in the play (figure 5). The forecast places the next four largest undiscovered pools in positions 3, 5, 6, and 8 on the pool rank plot. For all the undiscovered pools in the UM3 F1 play, the mean mean size is 14 MMBOE, which is smaller than the 18 MMBOE mean size of the discovered pools. The mean mean size for all pools, including both discovered and undiscovered, is 15 MMBOE.

BOE mean UCRR contribute 59 percent to the play's BOE mean total endowment. The UM3 F1 play includes areas covered by allochthonous salt sheets with exploration potential lying below and around these salt sheets, as well as in structural and stratigraphic traps around salt diapirs.